



Chapter Four

AIRPORT DEVELOPMENT ALTERNATIVES

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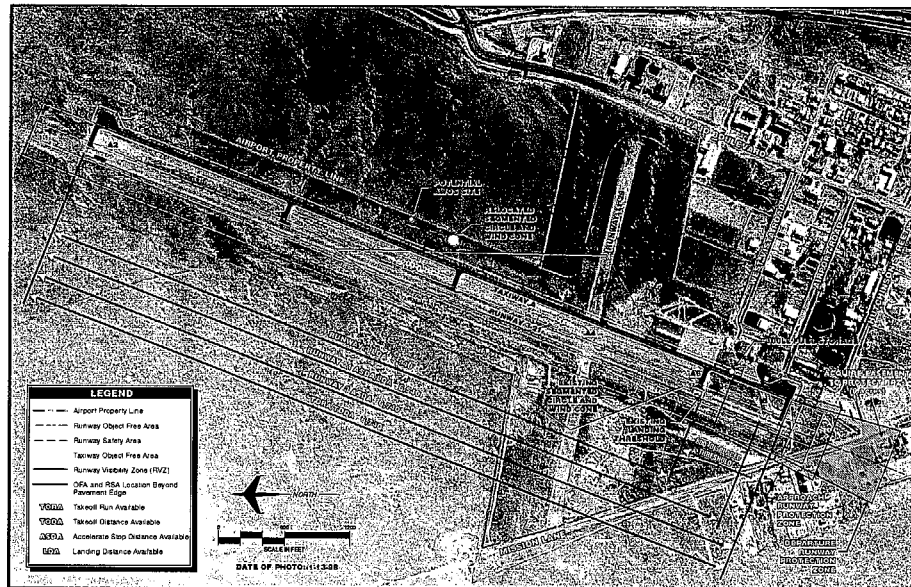
AIRPORT DEVELOPMENT ALTERNATIVES



Prior to defining the development program for the airport, it is important to consider development potential and constraints at the airport. In this chapter, a series of airport development scenarios are considered for the airport to satisfy the projected demand through the planning period and identify the highest

and best uses for airport property, taking into consideration existing physical and environmental constraints and appropriate federal design standards, where appropriate. The alternatives analysis is an important step in the planning process since it provides the underlying rationale for the final master plan recommendations.

Any development proposed for a Master Plan is evolved from an analysis of projected needs for a set period of time. Though the needs were determined by the best methodology available, it cannot be assumed that future events will not change these needs. The Master Planning process attempts to develop a viable concept for meeting the needs caused by projected demands through



the planning period. However, no plan of action should be developed which may be inconsistent with the future goals and objectives of the City of Holbrook and its citizens that have vested interest in the development and operations of the airport.

The evaluation of alternatives is a process of deciding which options are most compatible with the goals and objectives of the local area and the City of Holbrook. The alternatives considered are compared using economic and aviation factors to determine which of the alternatives best fulfill the aviation needs of the community as well as the region. After the evaluation process, a selected airport concept can be transformed into a realistic development plan.

For comparing the future development options for Holbrook Municipal Airport it is also important to consider the options of no future development ("no-action" alternative) at the airport, transferring aviation demand to another airport, and the construction at a new airport site.

The "no action" alternative essentially considers keeping the airport in its present condition and not providing for any type of improvement to the existing facilities. The primary results of this alternative would be the inability of the airport to satisfy the projected aviation demands of the airport service area as well as experience additional economic growth through the development of viable parcels of land.

The airport's aviation forecasts and the analysis of facility requirements indicated a need for a paved crosswind runway to safely serve general aviation aircraft when wind conditions are not favorable to using Runway 3-21. Additionally, the facility requirements analysis indicated a need for the establishment of Global Positioning System (GPS) approaches, additional airfield lighting, a public terminal building, and expanded hangar facilities.

Without these improvements to the airport facilities, regular and potential users of the airport will be constrained from taking maximum advantage of the airport's air transportation capabilities. The airport and the City of Holbrook would also not be able to accrue additional economic growth through the introduction of new and/or expanded businesses in the City.

The unavoidable consequences of the "no action" alternative would involve the airports inability to attract potential airport users. Corporate aviation plays a major role in the transportation of business leaders. Thus, an airport's facilities are often the first impression many corporate officials will have of the community. If the airport does not have the capability to meet hangar, apron, or airfield needs of the potential users, the City's capabilities to attract business that relies on air transportation will be diminished.

An overall impact of the alternative will be the inability to attract new users, especially those businesses and industries seeking location with adequate and convenient aviation facilities. Without regular maintenance and additional improvements, potential users and business for the City of Holbrook could be lost. To propose no further development at the airport would be inconsistent with current city planning to attract more business and industry to the City of Holbrook.

Transferring aviation services to another airport essentially considers limiting development at Holbrook Municipal Airport and relying on other airports to serve aviation demand for the City of Holbrook and surrounding areas. As detailed in Chapter One, there are two public use airports within 30 nautical miles of Holbrook Municipal Airport: Winslow-Lindbergh Regional Airport (28 nautical miles northwest) and Taylor Airport (27 nautical miles south). While each of these airports could accommodate a portion of the forecast demand for

Holbrook Municipal Airport, they are a considerable distance from the City of Holbrook and would not be in a good position to serve the City.

As new industries in the community begin to emerge and existing businesses expand, there will be a need for a highly functional airport. Commercial and general aviation activity play an important role in the way companies conduct their business. Holbrook Municipal Airport is expected to contribute to economic development of the area by serving the general aviation needs of the City of Holbrook and surrounding areas. This role is not easily replaced by another airport.

The alternative of developing an entirely new airport facility to meet the aviation needs of the City of Holbrook has also been considered. This was found to be a less feasible alternative, primarily due to economic and environmental concerns. Land acquisition, site preparation, and the construction of an entirely new airport can be a very difficult and costly action. In a situation where public funds are limited, the replacement of a functional airport facility would represent an unjustifiable loss of a significant public investment.

From social, political, and environmental standpoints, the commitment of a new large land area must be considered. The public sentiment towards new airports in the last few years has been very negative, primarily because a new airport normally requires the acquisition of several large parcels of privately-owned land. Furthermore, the development of

a new airport similar to Holbrook Municipal Airport would likely take ten years to become a reality and cost between \$15 and \$20 million. The potential exists for significant environmental impacts associated with disturbing a large land area when developing a new airport site.

Even if the additional expense to relocate the airport could be justified, it is unlikely that as ideal of a location could be found. The existing airport is uniquely situated next to an interstate highway and has direct access to the City of Holbrook via Navajo Boulevard. Areas immediately surrounding the airport have been zoned or planned for compatible industrial and commercial uses.

Overall, transferring service to an existing airport in the region or to an entirely new facility are unreasonable alternatives that should not be pursued. The airport is ideally located along Interstate I-40 and Navajo Boulevard to serve industrial and commercial users. With continued improvement, Holbrook Municipal Airport is fully capable of accommodating the long-term aviation demands of the City of Holbrook and should be developed in response to those demands. The airport has the potential to continue to develop as a quality general aviation airport that could greatly enhance the economic development of the community. Therefore, it is necessary to consider a series of development alternatives for the airport to satisfy projected demands and to improve the ability of the airport to foster additional economic growth in the City of Holbrook.

AIRPORT DEVELOPMENT OBJECTIVES

It is the overall objective of this effort to produce a balanced airside and landside complex to serve forecast aviation demands. However, before defining and evaluating specific alternatives, airport development objectives should be considered. The City of Holbrook provides the overall guidance for the operation and development of the Holbrook Municipal Airport. It is of primary concern that the airport is marketed, developed, and operated for the betterment of its users. With this in mind, the following development objectives have been defined:

- Develop an attractive, efficient, and safe aviation facility in accordance with federal safety regulations.
- Develop facilities to efficiently serve general aviation users and encourage increased use of the airport, including increased business and corporate use of the airport.
- Provide sufficient airside and landside capacity through additional facility improvements which will meet the long term planning horizon level of demand of the area.
- Target local economic development through the development of available property for both aviation-related and non-aviation related commercial and industrial uses.

The remainder of the chapter will describe various development alternatives for the airside (airfield) and landside facilities (aircraft storage hangars, apron, and terminal areas). Within each of these areas, specific facilities are required or desired. Although each area is treated separately, planning must integrate the individual requirements so that they complement one another.

AIRFIELD ALTERNATIVES

Airfield facilities are, by nature, the focal point of the airport complex. Because of their primary role and the fact that they physically dominate airport land use, airfield facility needs are often the most critical factor in the determination of viable airport development alternatives. In particular, the runway system requires the greatest commitment of land area and often imparts the greatest influence of the identification and development of other airport facilities. Furthermore, aircraft operations dictate the FAA design criteria that must be considered when looking at airfield improvements. These criteria, depending upon the areas around the airport, can often have a significant impact on the viability of various alternatives designed to meet airfield needs. The primary planning issues related to the airfield include:

- Runway 3-21 Usable Length and Runway Safety Areas
- Runway 3-21 Parallel Taxiway Location and Separation (from Runway)

- Crosswind Runway
- Automated Weather Observation System Siting

RUNWAY 3-21

Runway 3-21 presently serves as the primary runway at the airport and is 6,698 feet long. As indicated in the facility requirements analysis, the existing length falls only 102 feet short of the recommended length needed to serve the existing and future mix of aircraft expected to utilize the airport. Therefore, there is not an immediate requirement for additional runway length. However, due to the displaced landing threshold on Runway 3 and safety area requirements, it is important to define the usable runway lengths for departure and landing operations to Runway 3-21.

As shown on **Exhibit 4A**, the Runway 3 landing threshold has been displaced 800 feet to the north to reduce the impacts of aircraft noise from landing aircraft overflying nearby residential developments south of Mission Lane. The effects of the displaced threshold are that for aircraft landing to Runway 3, only 5,940 feet of the total 6,740 feet of pavement is available for landing. However, the full 6,740 is available for departures to the north along Runway 3.

When displacing a landing threshold, FAA guidelines require two runway protection zones (RPZs) - an approach RPZ and departure RPZ. (An RPZ is a trapezoidal area off the end of the runway to enhance the protection of people and property on the ground by providing for an area clear of objects

which are incompatible with the overflight of aircraft.) Normally, the approach and departure RPZ overlap (i.e. Runway 21). As shown on **Exhibit 4A**, portions of both the approach and departure RPZs for Runway 3 extend outside existing airport boundaries. Shown in green hatch are areas which should be considered for acquisition to protect the RPZ from incompatible development. The acquisition of approximately 8 acres of land or avigation easements would be required to fully protect these RPZs from future incompatible development.

Shown in orange on **Exhibit 4A** are the limits of the Runway 3-21 object free area (OFA). Shown in pink are the limits of the Runway 3-21 runway safety area (RSA). The Federal Aviation Administration (FAA) defines the OFA as "a two dimensional ground area surrounding runways, taxiways, and taxilanes which is clear of objects except for objects whose location is fixed by function (i.e. airfield lighting)." The runway safety area (RSA) is defined as "a defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway."

The RSA for Runway 3-21 is 150 feet wide centered on the runway centerline and extends 300 feet beyond each runway end. The OFA is 500 feet wide centered on the runway centerline and extends 300 feet beyond each end of the runway. In most instances, the RSA and OFA would extend 300 feet beyond the end of the actual runway pavement. However, extending the OFA 300 feet beyond the Runway 3 pavement edge

places the OFA outside the existing airport property line and along Mission Lane (shown in purple on **Exhibit 4A**). As discussed previously, FAA standards preclude any development in the OFA which is not specifically required for aircraft operations. Fencing and roadways are considered incompatible with the OFA. The FAA encourages these areas to be under the control of the airport to prevent the development of incompatible objects.

Two options can be considered to comply with the OFA requirements. The first option is to provide for the full OFA safety areas by clearing and grading the full OFA area. For the Runway 3 end, this would require relocating Mission Lane outside the limits of the OFA. During the review of development alternatives this option was removed from consideration because of the costs associated with the realignment of Mission Lane and existing land use constraints which would make the realignment difficult.

The second option is to relocate the OFA into the areas of the runway end which are not obstructed. This option is detailed on **Exhibit 4A**. As shown by the orange and magenta lines, the OFA and RSA have been located within the limits of airport property. When the full safety areas cannot be provided from the pavement edge, the FAA utilizes a concept known as "declared distances" to ensure that the full safety areas are provided during critical aircraft operational activities. Specifically, declared distances incorporate the following concepts:

Takeoff Runway Available (TORA) - The runway length declared available

and suitable for the ground run of an airplane taking off;

Takeoff Distance Available (TODA)

- The TORA plus the length of any remaining runway and/or clearway beyond the far end of the TORA;

Accelerate-Stop Distance Available (ASDA)

- The runway plus stopway length declared available for the acceleration and deceleration of an aircraft aborting a takeoff; and

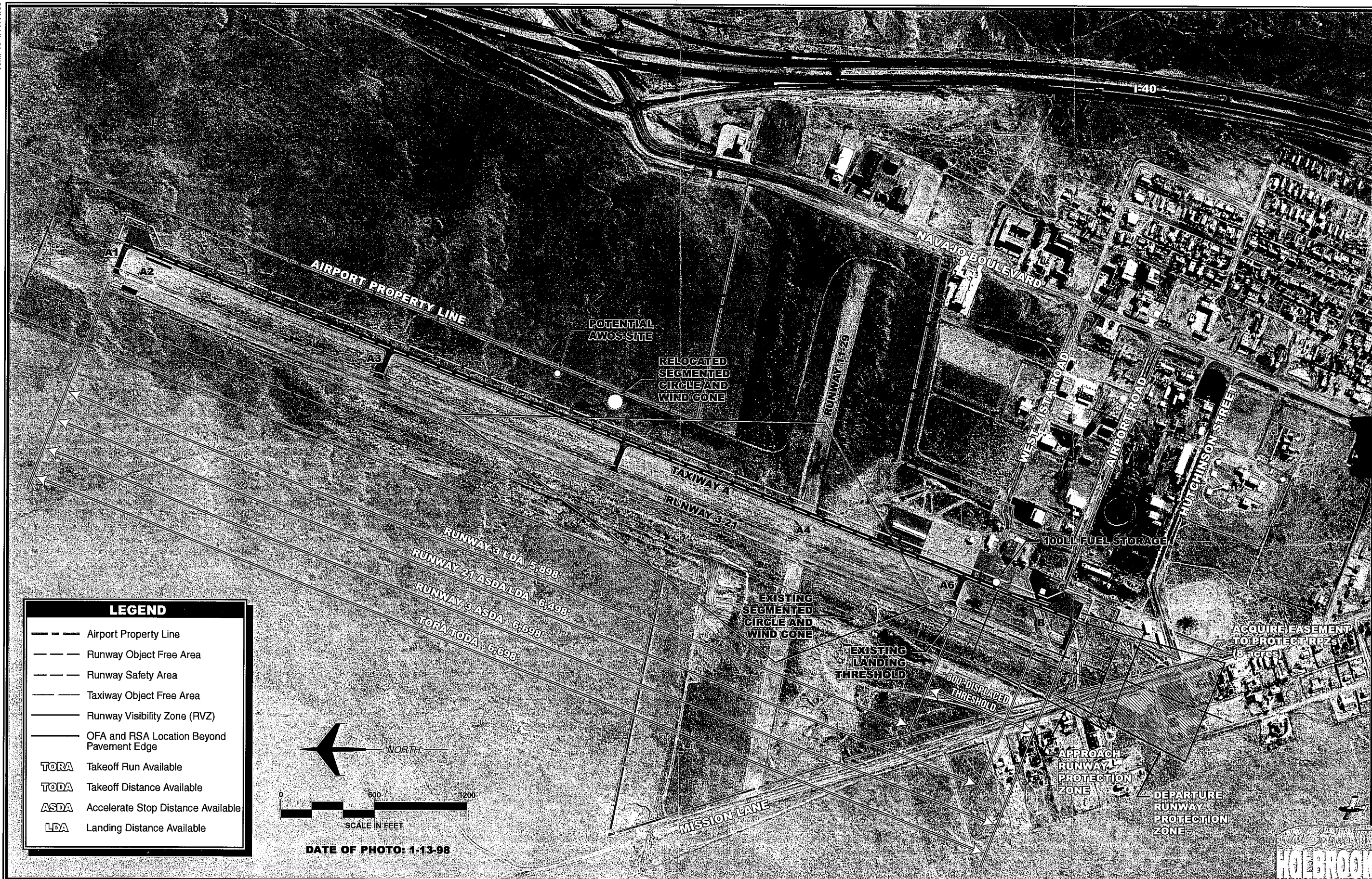
Landing Distance Available (LDA)

- The runway length declared available and suitable for landing.

Exhibit 4A summarizes declared distances for Holbrook Municipal Airport, considering the displaced landing threshold discussed above and the relocation of the Runway 3 OFA inside the airport property line.

As shown on **Exhibit 4A**, the TORA and TODA are equal to the actual pavement available since a clearway has not been designated for the airport. When determining the ASDA, FAA guidelines require that the full RSA and OFA safety areas be provided at the far end of the runway an aircraft is departing. For example, the ASDA for Runway 21 is reduced by 200 feet, the distance necessary to locate the Runway 3 OFA inside the airport property line. The full OFA and RSA safety areas are provided off the Runway 21 end. Therefore, departure operations to the north along Runway 3 are not limited and the ASDA is equal to the actual pavement length available of 6,698 feet.

The LDA must provide the full RSA at the approach end of the runway, as well



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as at the roll-out end of the runway. Since the full RSA and OFA safety areas are provided at the Runway 21 end (the roll-out end for landing operations to Runway 3), the Runway 3 LDA is only reduced by 800 feet, equal to the amount of the displaced landing threshold. For Runway 21, the LDA is reduced by 200 feet, the amount necessary to relocate the Runway 3 OFA inside the airport property line.

As shown on **Exhibit 4A**, the existing segmented circle and lighted wind cone are within the limits of the Runway 3-21 OFA. As discussed previously, OFA clearing standards preclude any development in the OFA which is not fixed by function, i.e. pavement edge lighting. Therefore, as indicated in the facility requirements analysis in Chapter Three, consideration may be given to relocating the segmented circle and lighted wind cone outside the limits of the OFA.

Exhibit 4A depicts a potential location for the segmented circle and lighted wind cone along the eastern boundary of the airport considering the location of both existing runways. As will be discussed in more detail later in this chapter, the development of a paved crosswind runway is considered in this area. Should the crosswind runway be developed in this area, it would be necessary to designate an alternate location for the segmented circle and lighted wind cone. Most important to the final siting of the segmented circle and lighted wind cone will be that it is located in an area not planned for future development and that segmented circle and lighted wind cone are outside of any safety areas including the runway visibility zone (RVZ).

The RVZ is required for airports without a continuously operating airport traffic control tower and intersecting runways. The RVZ is intended to provide adequate line-of-sight for aircraft between the intersecting runways and reduce the possibility of aircraft collisions resulting from two aircraft using different runways. RVZ standards apply at Holbrook Municipal Airport since there is not an operating airport traffic control tower.

The dimensions of the RVZ vary depending upon the distance between the runway intersections and runway ends. The existing limits of the RVZ for Holbrook Municipal Airport are depicted on **Exhibit 4A**.

The RVZ clearing standards specify that this area should be clear of permanent objects which could prevent an adequate view of the intersecting runway. Future facility development should be directed outside the limits of the RVZ to ensure that the RVZ remains as clear as possible of any objects which could compromise the safety of aircraft operations at the airport.

Exhibit 4B depicts Runway 3-21 Alternative B. In contrast to Alternative A depicted on **Exhibit 4A**, this alternative shifts Runway 3-21 1,302 feet to the northeast to locate the RPZ and OFA within the existing airport property line and meet the minimum runway length recommended by the FAA for the mix of aircraft which use the airport. This eliminates the need to acquire property as previously indicated. In this alternative, 1,302 feet of pavement is added to Runway 21 to

avoid the loss of runway as a result of relocating the Runway 3 threshold and meet runway length requirements. This would increase the overall length to 6,800 feet. The unused runway pavement and Taxiway B would be removed.

Relocating the Runway 21 threshold to the northeast, places the Runway 21 RPZ outside of the airport property line. Approximately 17 acres of land will need to be acquired to protect airspace and safety areas for Runway 3-21. The runway visibility zone would also increase, requiring approximately 129 acres of land to be acquired to protect this area between Runways 3-21 and the proposed crosswind Runway 11-29. This alternative, in contrast to the alternative shown on **Exhibit 4A**, eliminates the need for "declared distances" because of the relocation of the runway threshold and runway safety areas being fully met at the Runway 3 end.

RUNWAY 3-21 PARALLEL TAXIWAY

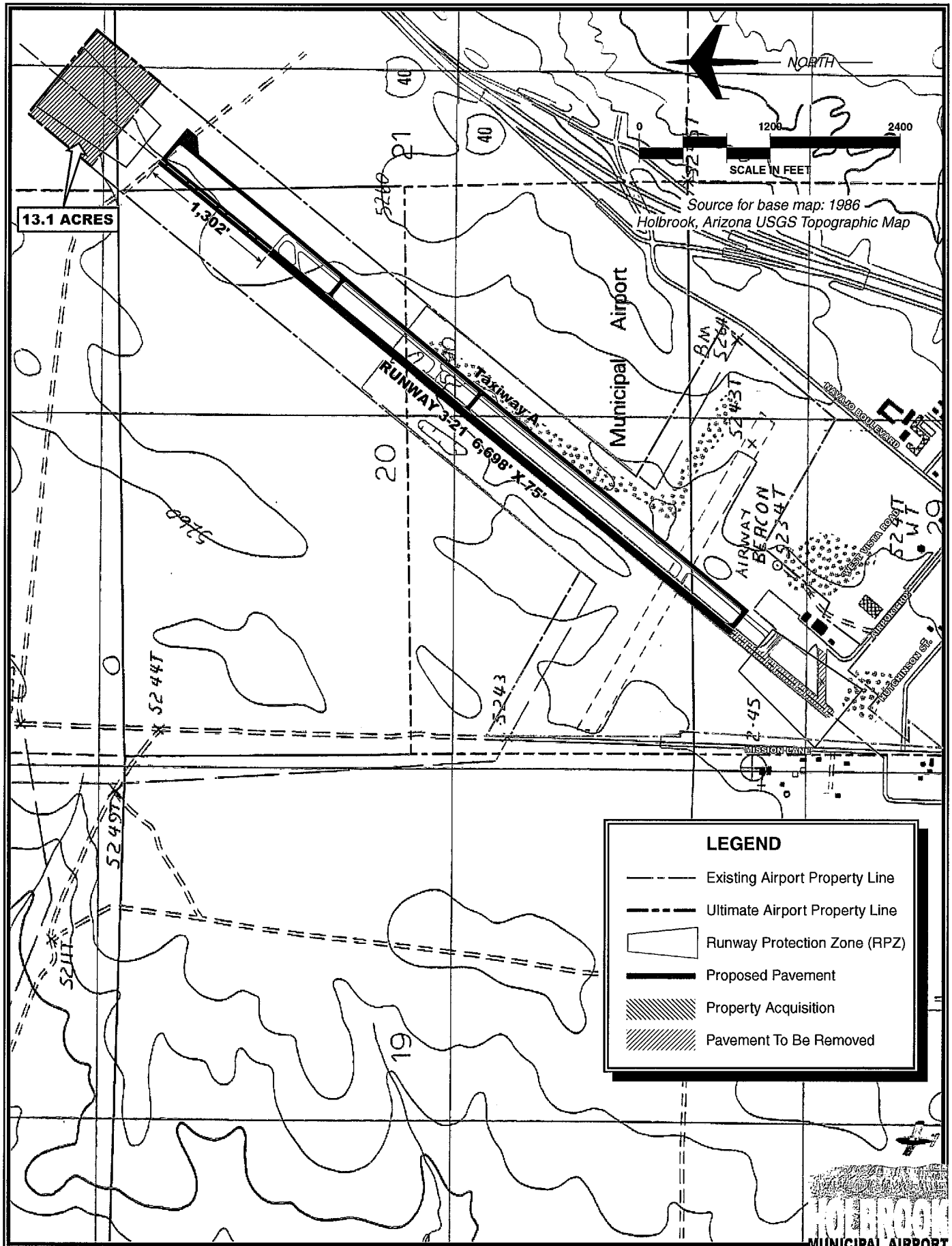
Taxiway A is located approximately 200 feet east of Runway 3-21. For Runway 3-21, FAA design standards specify a runway/taxiway separation distance of 240 feet. Additionally, Taxiway A only extends between the Runway 21 end and the Runway 3 displaced landing threshold. **Exhibit 4A** depicts an alternative of relocating Taxiway A approximately 40 feet east to conform with FAA runway/taxiway separation criterion and extend the full-length of Runway 3-21. As shown on the exhibit, the relocated taxiway alignment would align the parallel taxiway along the

western edge of the aircraft parking apron.

The taxiway OFA defines the maximum limit for tiedown locations and facility development. Relocating Taxiway A as shown displaces approximately 10 aircraft tiedown positions and the existing above-ground 100LL fuel storage tank installed in January 1999 as these facilities are within the limits of the Taxiway OFA.

Holding aprons allow aircraft to prepare for departure in an area off of the taxiway. Holding aprons serve the needs of piston-engine general aviation aircraft, as these aircraft generally require a longer time near the runway end to prepare for takeoff than do jet aircraft. Without these holding aprons aircraft behind general aviation aircraft are delayed as they must wait for these aircraft to prepare for departure. By providing an area off the taxiway for these aircraft to prepare for takeoff, aircraft ready for departure are allowed to pass for immediate takeoff. A holding apron is shown at each runway end.

The existing connecting taxiway system along Runway 3-21 has been realigned to provide a more efficient layout. This includes eliminating Taxiway A2 at the Runway 21 end, constructing an additional exit taxiway between Taxiways A3 and A4, and realigning Taxiway B. Presently, Taxiway A2 serves as a bypass taxiway. In this manner, Taxiway A2 allows aircraft ready for departure to bypass aircraft which may be preparing for departure along Taxiway A1. Should a holding apron be constructed at the Runway 21 end, Taxiway A2 will no longer be needed as aircraft preparing for



departure will be located in the holding apron and aircraft ready for departure can enter the runway and not be blocked by those aircraft preparing for departure. The development of an exit taxiway between Taxiways A3 and A4 will enhance airfield safety and capacity by reducing the amount of time that aircraft occupy the runway. Taxiway B has been realigned at the traditional right-angle to the runway. This allows for greater visibility of both approach paths to each end of Runway 3-21 and for monitoring ground operations along the runway.

In reviewing alternatives for increasing the runway/taxiway separation distance at Holbrook Municipal Airport, it is possible to consider the "no action" alternative. This involves maintaining the taxiway in its present location. Pursuing this option requires special approval from the FAA and a modification to design standard declaration. The advantage of this alternative is that the 100LL fuel storage tank and aircraft tiedown positions are not displaced. A disadvantage is that Taxiway A would not extend the full length of Runway 3-21 and it would be necessary to continue to taxi onto the apron to access the Runway 3 end.

AUTOMATED WEATHER OBSERVING SYSTEM (AWOS)

The facility requirements analysis determined that an AWOS is needed at Holbrook Municipal Airport to provide important weather details to pilots, especially transient and charter aircraft operators (charter companies cannot operate to the airport without current weather data). An AWOS includes

various sensors for recording cloud height, visibility, wind, temperature, dewpoint, and precipitation. *FAA Order 6560.20A, Siting Criteria For Automated Weather Observing Systems (AWOS)* was reviewed for general siting requirements. While each AWOS sensor has specific siting requirements, all AWOS sensors should be located together and outside the runway and taxiways object free areas. Generally, AWOS sensors are best placed between 1,000 and 3,000 feet from the primary runway threshold and between 500 and 1,000 feet from the runway centerline.

Local prevailing winds are from the west-southwest leading to a greater use of Runway 21. Therefore, following AWOS siting criteria, the AWOS should be situated along this runway end as Runway 21 serves as the primary runway threshold. **Exhibit 4A** depicts a potential location for an AWOS site following the AWOS siting criteria.

The AWOS has been situated in a location similar to the location of the segmented circle and lighted wind cone. The selected alternative for the development of a crosswind runway could potentially affect the development of an AWOS in this location since an alternative under consideration would place the crosswind runway in this general area. Therefore, final siting of the AWOS will be dependent upon the selected crosswind runway development alternative. Most important to the final siting of the AWOS will be that it is located in an area not planned for future development and that the AWOS is located outside of any safety areas including the runway visibility zone (RVZ).

CROSSWIND RUNWAY

Presently, the airport is served by crosswind Runway 11-29 oriented in a northwest-southeast direction. Presently, Runway 11-29 provides a dirt surface and is 3,200 feet long. The wind analysis completed in Chapter Three confirmed that two runway orientations are needed at Holbrook Municipal Airport to safely accommodate all aircraft operating at the airport during all wind conditions. Based upon the most current ten years of wind data, the development of a crosswind runway in the same orientation as the existing crosswind runway was recommended. To enhance the safety of operations to this runway, this runway was recommended to be paved and equipped with a parallel taxiway. FAA design standards specify a length of 4,900 feet and width of 60 feet for this runway.

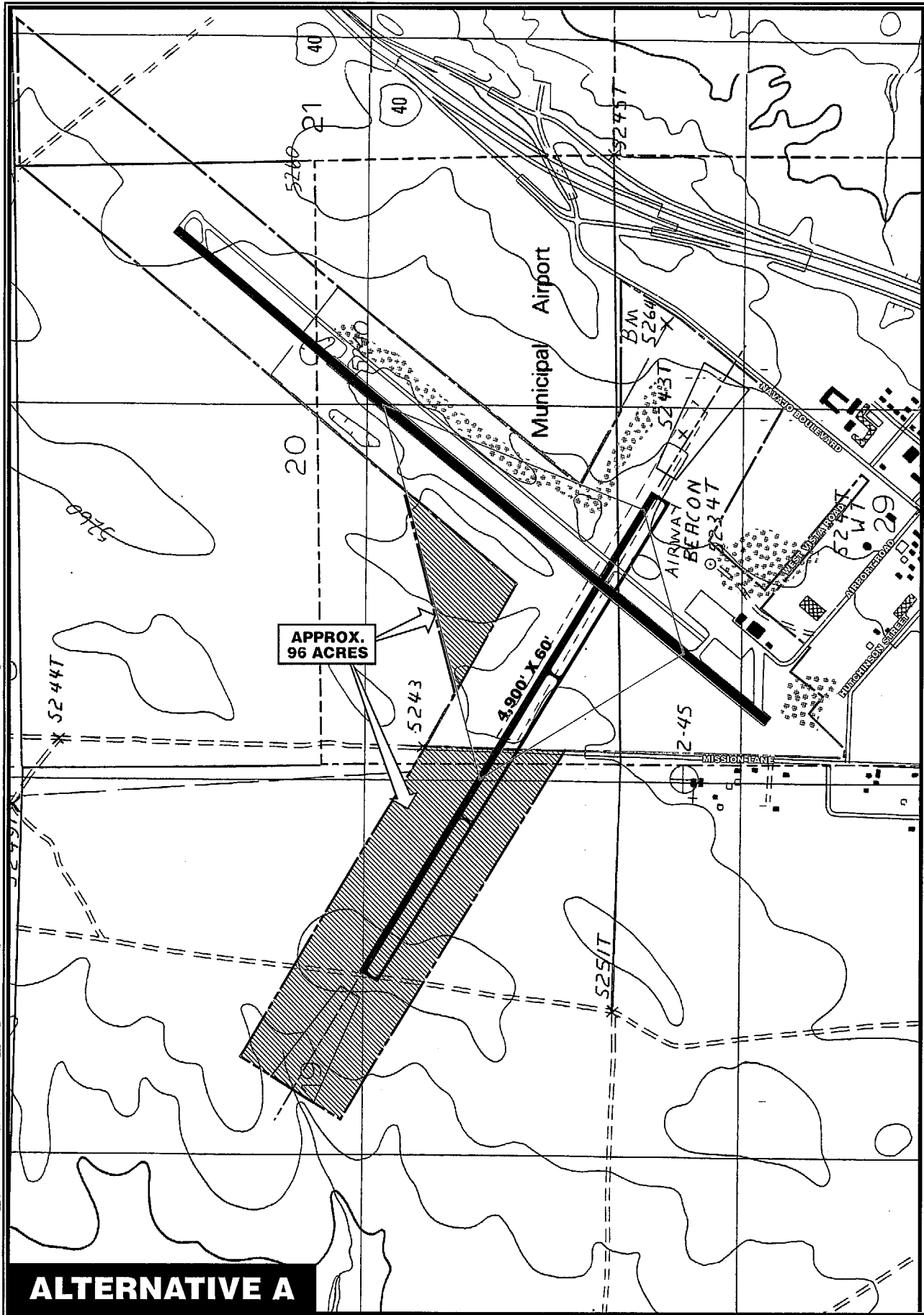
Exhibit 4C depicts two alternatives for the development of a paved crosswind runway at Holbrook Municipal Airport. Crosswind Runway Alternative A examines the option of reconstructing Runway 11-29 in its present position. In this alternative, the crosswind runway would be positioned so that the Runway 29 RPZ at the east end would be positioned entirely on existing airport property. This ensures that existing facilities along Navajo Boulevard would not be located within the Runway 29 RPZ and enable the City of Holbrook to have full control over the Runway 29 RPZ to prevent incompatible development in the future. As shown on the exhibit, the acquisition of approximately 96 acres of land is required to protect the RVZ, Runway 11 RPZ, and provide sufficient area for the

construction of the runway and parallel taxiway.

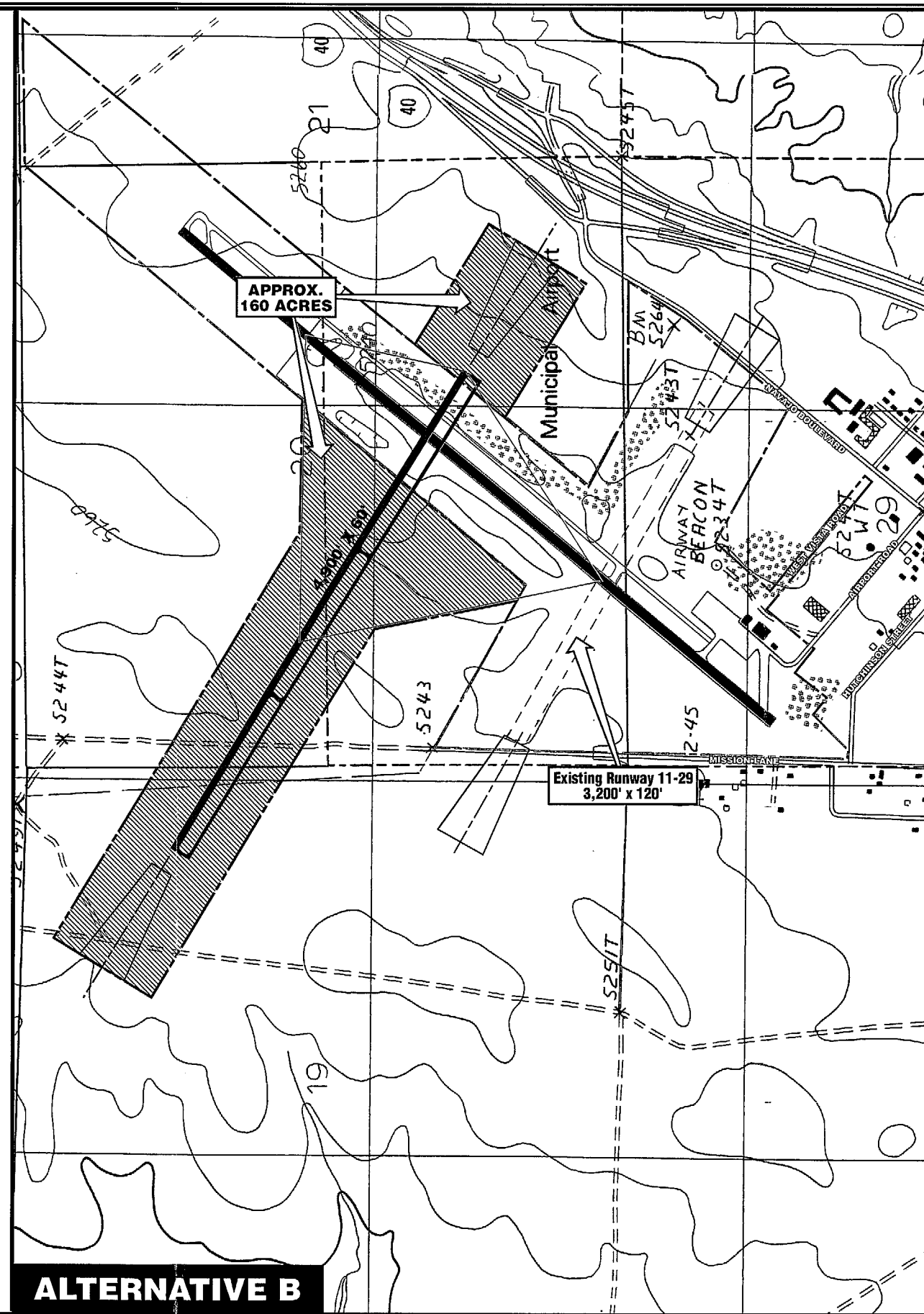
Crosswind Runway Alternative B incorporates recommendations of previous planning documents which provided for the development of the crosswind runway north of its present position to ensure that any flight paths for the crosswind runway would not be located over commercial and residential development east of Navajo Boulevard. The placement of the runway in Alternative B varies from previous planning documents as this runway is located only 2,100 feet north of the existing location of Runway 11-29. The previous Master Plan provided for the development of the crosswind runway 3,200 feet north of the existing location of Runway 11-29. By positioning a future crosswind runway as depicted in Alternative B, all future flight paths to the crosswind runway would be located north of the Navajo Boulevard/Interstate 40 interchange. Additionally, the runway would be closer to the existing terminal area, reducing taxi distances when compared with previous Master Plan recommendations. The acquisition of approximately 160 acres of land is required to provide sufficient area for the development of the runway and parallel taxiway and protect the RVZ and RPZs to each runway end.

An advantage of Alternative A is that this alternative maximizes the development of existing airport property dedicated for the crosswind runway. However, aircraft flight paths would still be located over existing commercial and residential development to the east. When compared with Alternative B, Alternative A has less property acquisition requirements.

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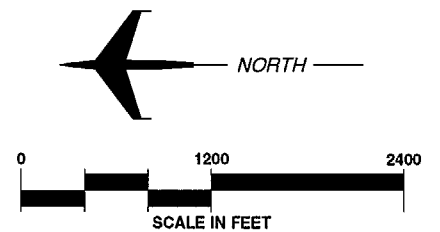


ALTERNATIVE A



ALTERNATIVE B

- LEGEND**
- Existing Airport Property Line
 - Ultimate Airport Property Line
 - Runway Visibility Zone (RVZ)
 - Runway Protection Zone (RPZ)
 - Proposed Pavement
 - Property Acquisition



Source for base map: 1986
Holbrook, Arizona USGS Topographic Map



While aircraft taxi distances to the terminal area would be greater under Alternative B (when compared to Alternative A), locating the crosswind runway in this position would ensure a clear approach path to the runway and eliminate many direct overflights of residential and commercial development east of Navajo Boulevard. However, taxi distances to this runway can be expected, in most cases, to be less than existing taxi distances to the Runway 21 end from the existing terminal area. Presently aircraft must taxiway approximately 5,900 feet to reach the Runway 21 end. To access the Runway 29 end under Alternative B, aircraft would be required to taxi approximately 3,400 feet. To access the Runway 11 end under Alternative B, aircraft would be required to taxi approximately 7,400 feet. For comparison, to access the Runway 29 end under Alternative A, aircraft would be required to taxi approximately 1,700 feet. To access the Runway 11 end under Alternative A, aircraft would be required to taxiway approximately 5,000 feet.

LANDSIDE DEVELOPMENT ALTERNATIVES

The primary landside functions to be accommodated at Holbrook Municipal Airport include aircraft storage hangars, aircraft maintenance facilities, public terminal facilities, and airport-related businesses. The inter-relationship of these functions is important to defining a long range landside layout for the airport. To a certain extent landside uses need to be grouped with similar uses or uses that are compatible. Other functions should

be separated, or at least have well defined boundaries for reasons of safety, security, and efficient operation. Finally, each landside use must be planned in conjunction with the airfield, as well as ground access that is suitable to the function. Runway frontage should be reserved for those uses with a high level of airfield interface, or need of exposure. Other uses with lower levels of aircraft movements, or little need for runway exposure can be planned in more isolated locations. The following briefly describes landside facility requirements.

Fixed Based Operator (FBO): This essentially relates to providing areas for the development of facilities associated with aviation businesses that require airfield access. This includes businesses involved with (but not limited to) aircraft rental and flight training, aircraft charters, aircraft maintenance, line service, and aircraft fueling. Businesses such as these are characterized by high levels of activity with a need for apron space for the storage and circulation of aircraft. In addition, the facilities commonly associated with businesses such as these include large, conventional type hangars which hold several aircraft. Utility services are needed for these type of facilities as well as automobile parking areas.

Presently, a 7,500 square-foot hangar provides area for these types of activities at the airport. As noted in Chapter One, this building was built in the 1940's and is nearing the end of its useful life. The landside alternatives will consider replacing this facility during the planning period and providing an additional large

conventional hangar for fixed based operator services. The facility requirements analysis projected a long term need for approximately 21,000 square feet of large conventional hangar space.

Terminal Building: General aviation terminal facilities have several functions including: providing space for passenger waiting, a pilot's lounge, flight planning, concessions, airport management, storage, and various other needs. Utility services are needed for this type of facilities as well as automobile parking areas. Terminal buildings are best placed along the apron for ease of access to aircraft.

Currently, a portion of the large aircraft storage serves as the airport terminal building. The facility requirements analysis indicated a need for a separate public terminal building to replace this aging facility.

Parking and Access: Presently, there are no public vehicle parking available at the airport. Access to the apron areas is available for based aircraft owners. A need exists to develop alternative access and parking locations which eliminates the need for vehicles to cross aircraft parking aprons to access aircraft tiedown and hangar facilities. The landside alternatives will consider options to segregate vehicle and aircraft movement areas to the extent possible to provide for greater airfield safety and security.

Enclosed T-Hangars: The facility requirements analysis indicated that an additional six T-hangar units would be needed to accommodate projected long term demand. However, the landside

alternatives will consider T-hangar development in excess of this requirement to ensure that the airport has sufficient capacity to accommodate demand beyond the planning period and unforeseen growth in hangar demand.

Apron: While the existing apron area and number of aircraft tiedown positions are sufficient for expected demand through the planning, the landside alternatives must consider the potential relocation of Taxiway A. As noted earlier, relocating Taxiway A displaces 10 existing tiedown locations.

Fuel Storage: The City of Holbrook recently constructed an 11,750 gallon above-ground fuel storage tank along the western edge of the apron for 100LL fuel storage. This tank replaced existing underground fuel storage tanks which were abandoned to conform with Federal fuel storage guidelines. As discussed previously, should Taxiway A be relocated, it would be necessary to relocate this fuel tank. Additionally, the facility requirements indicated a future need for Jet-A fuel storage. To accommodate future fuel storage needs, the landside alternatives will consider the development of a consolidated fuel farm, providing both Jet-A and 100LL fuel storage.

An option for future fuel storage is to locate the fuel storage tanks on or near the apron. This allows for fueling directly from the fuel storage tanks which can be located conveniently near the terminal building. This also allows for the establishment of a self-service fueling island. Under this option, pilots could refuel their own aircraft using a credit card. Another option is to locate the storage tanks in an area off the

apron. Under this option, mobile fuel trucks would be required for refueling. While both options are feasible at the airport, the location of the tanks along the apron would be less costly to operate and could offer the additional possibility of after hours refueling. Both options will be considered in the landside alternatives analysis.

Recreational Area: Members of the Planning Advisory Committee expressed a desire to establish a recreational area on the airport for pilots. In most cases, a recreational area provides improved camp sites for pilots. The landside alternatives will consider locations for the recreational area considering the need to locate this area in the vicinity of the terminal area for security purposes and near the apron for aircraft tiedown.

Hangar Lease Parcels: This involves providing parcels of land for businesses or individuals who wish to construct their own aircraft storage hangar. Parking and utilities such as water and sewer should be considered for these areas.

Other Facilities: The facility requirements analysis indicated that consideration should be given to developing an aircraft wash/maintenance facility to provide a suitable area for the washing of aircraft and for aircraft owner's to complete minor maintenance activities.

Prior to considering landside development alternatives, constraints within the existing terminal area must be addressed. The existing property line and location of the rotating beacon and airfield lighting systems electrical vault

limit development to the east along the aircraft apron. While the rotating beacon and electrical vault can be relocated, the landside alternatives will consider options to retain the rotating beacon and electrical vault in their existing location to avoid the costs of relocating these facilities. The location of the helipad prevents the development of FBO hangars along this portion of the apron since aircraft tiedown positions cannot be conveniently located within in this area.

Future landside development alternatives have been limited to the existing terminal area. This area provides sufficient capacity to accommodate future demand well beyond the planning period. Additionally, a significant investment has been made in the infrastructure in this area, including apron, roadway, and utility development.

Since the location of the future crosswind runway impacts the options available for development within the existing terminal area, the landside alternatives have been developed considering the crosswind runway alternatives depicted on **Exhibit 4C**. Landside Alternative A considers development options should the crosswind runway be retained in its existing location. Landside Alternative B considers development options should the crosswind runway be developed north of its present position as depicted in Crosswind Runway Alternative B.

Exhibit 4D depicts Landside Alternative A. In this alternative, future general aviation facilities have been developed along the east side of the apron and parcels of land within

airport property have been reserved for private and industrial use. This alternative assumes Taxiway A would remain in its existing location and be extended to Taxiway B to provide parallel taxiway access the full length of Runway 3-21.

In this alternative, T-Hangars are expanded to the east towards the rotating beacon and electrical vault. An existing port-a-port hangar and T-hangar are removed to provide for the development of a public terminal building and two FBO conventional hangars along the existing edge of the aircraft parking apron. Vehicle parking areas are developed along the east side of these facilities and are intended to serve T-hangar parking needs as well. The area to the south is designated for the development of individual/corporate hangars and an aircraft wash/maintenance facility. The existing aircraft storage/maintenance hangar is eventually removed for hangar development. Jet-A and 100LL fuel storage is consolidated along the south boundary of the airport. A second area for corporate hangar development is shown along Runway 11-29. A small recreational area is reserved along the north edge of the aircraft parking apron. Remaining parcels of land are designated for commercial/industrial development, many with the potential for airfield access.

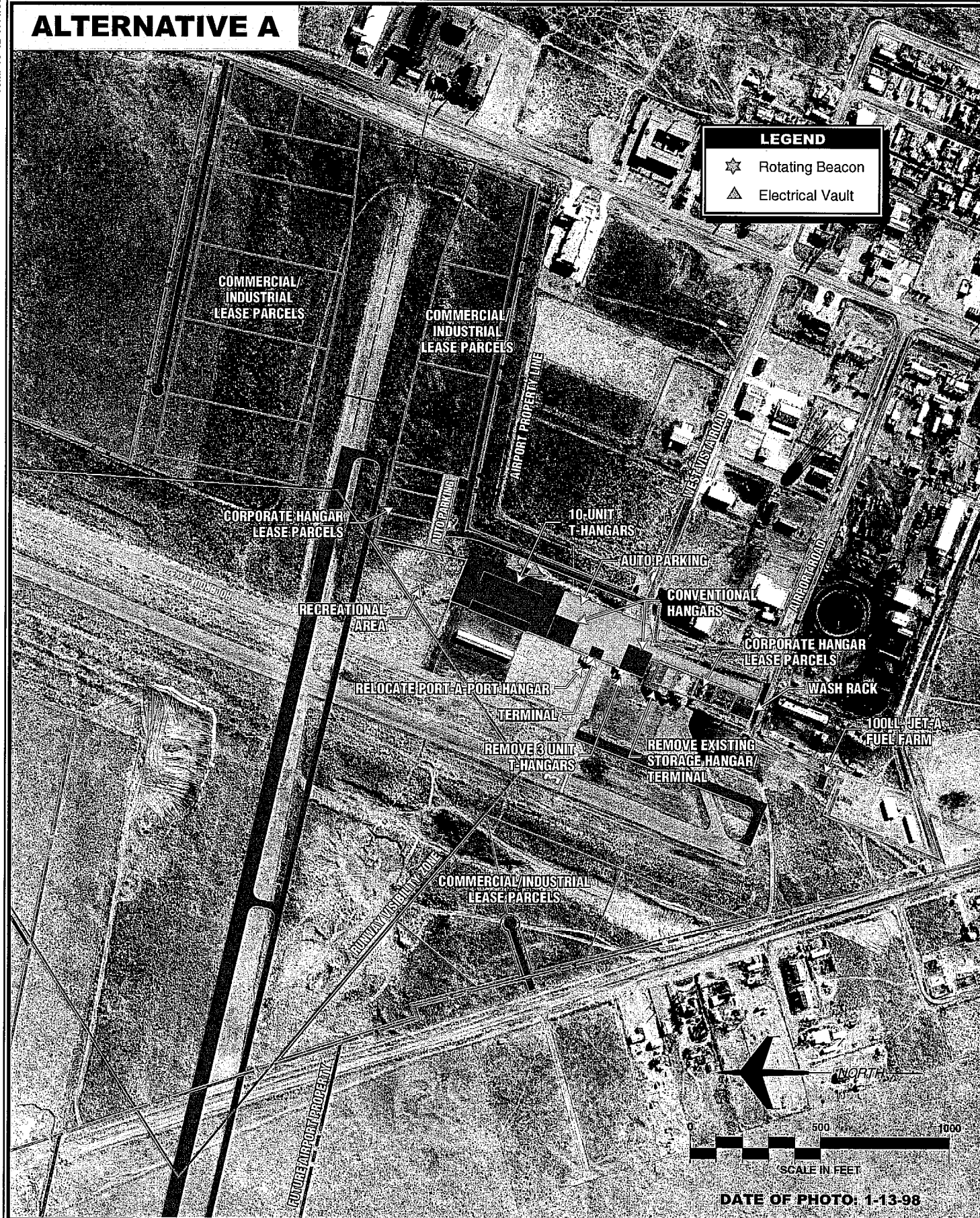
Advantages: The public terminal building and FBO facilities are located along the primary entrance road. Sufficient area is provided to meet general aviation demand well beyond the planning period of this Master Plan. The proposed layout maximizes the use of airport property. Potential airport

revenues are maximized through the development of commercial and industrial uses. The recreational area is positioned close to the apron area. This alternative avoids the relocation of the rotating beacon and electrical vault. All proposed general aviation development is adjacent to existing utilities service lines.

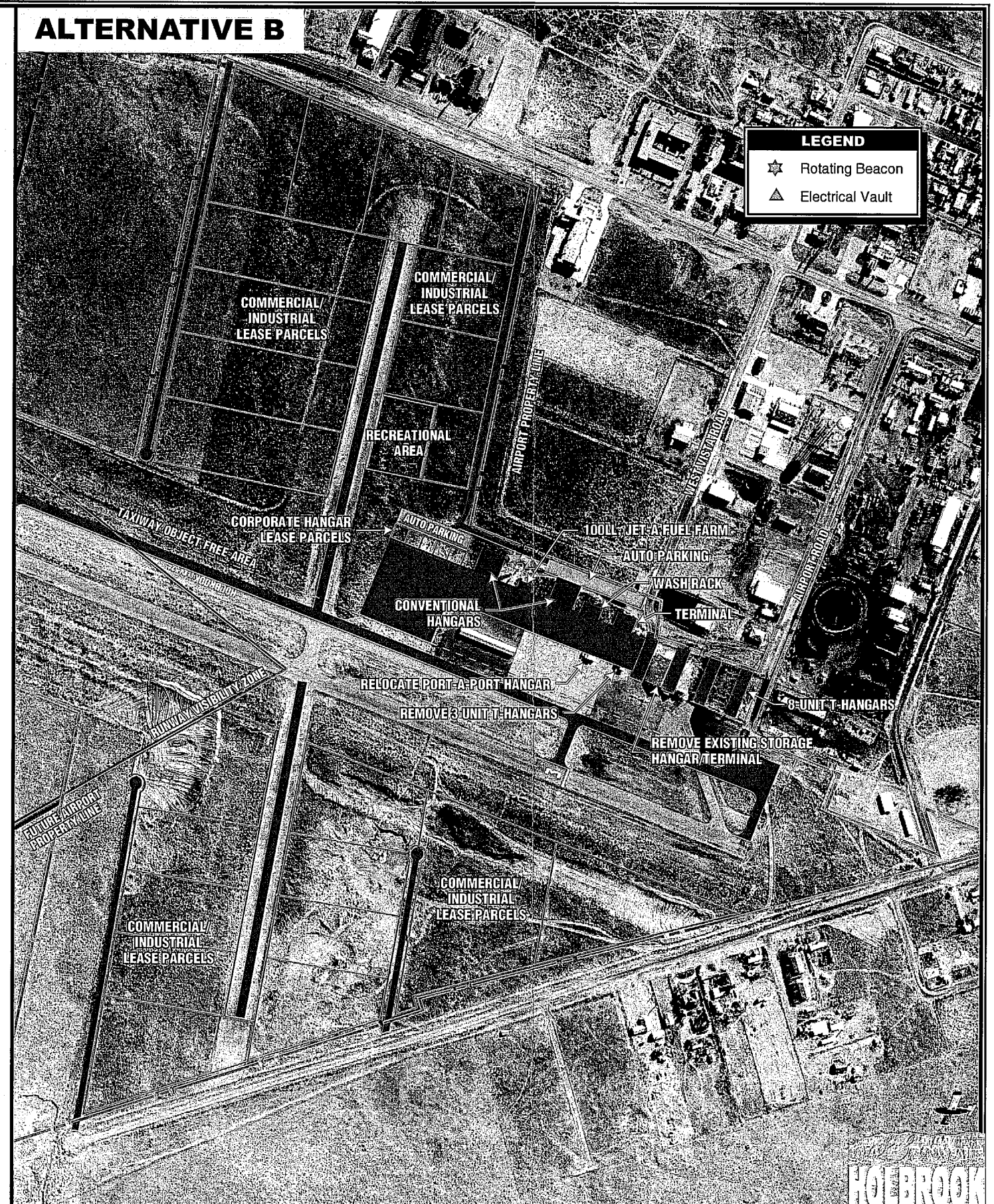
Disadvantages: The location of the fuel storage tanks eliminates the option for self fueling and the need to operate mobile fuel trucks for fuel delivery. Future apron expansion is limited by the location of the recreational area to the north and placement of facilities along the eastern edge of the apron.

Exhibit 4C also depicts Landside Alternative B. In this alternative, the east side of the apron has been expanded outward towards the airport property line to allow for the apron space that would be lost if Taxiway A is relocated to conform with FAA design standards. In contrast to Landside Alternative A, the area between West Vista Road and Airport Road would be reserved for the development of four, eight unit T-hangars. The area behind the hangars would be reserved for automobile parking. The terminal, aircraft wash/maintenance facility, and FBO conventional hangars are located along the edge of the expanded aircraft parking apron. A consolidated fuel farm is located near the rotating beacon and electrical vault. Corporate hangar parcels are reserved along the western edge of an expanded apron. A recreational area is designated northeast of the apron. Since the crosswind runway would be relocated to the north in the alternative, the area presently reserved for the crosswind

ALTERNATIVE A



ALTERNATIVE B



runway could be designated for commercial/industrial uses. This alternative depicts the option of developing taxiways to provide access to these parcels.

Advantages: The public terminal building and FBO facilities are located along the primary entrance road. Sufficient area is provided to meet general aviation demand well beyond the planning period of this Master Plan. The proposed layout maximizes the use of airport property. Potential airport revenues are maximized through the development of commercial and industrial uses. The recreational area is positioned close to the apron area. This alternative avoids the relocation of the rotating beacon and electrical vault. All proposed general aviation development is adjacent to existing utilities service lines. Taxiway A is relocated to conform with FAA design standards. Fuel storage facilities are located along the apron edge which would allow for stationary and self-service fueling and eliminate the need for mobile fuel trucks for fuel delivery.

Disadvantages: The recreational area, as compared to Alternative A, is situated further north from the aircraft parking area. This alternative requires extensive expansion of the aircraft parking apron.

SUMMARY

The process utilized in assessing the landside and airside development

alternatives involved a detailed analysis of short and long term requirements as well as future growth potential. Current airport design standards were considered at every stage of development. The proposed development plan for the airport must represent a means by which the airport can grow in a balanced manner to accommodate forecast demand for both the airside and landside areas. In addition, it must provide for flexibility in the plan to meet activity growth beyond the 20-year planning period.

The next action step is the determination of a final master plan concept after the alternatives have been reviewed by the Planning Advisory Committee and the City of Holbrook. Once the concept has been identified, cost estimates will be prepared for the individual projects, and a development schedule will be prepared. Potential funding sources for recommended projects will also be identified (including those projects that are eligible for federal or state funding assistance). The remaining chapters of the master plan will be used to refine a final concept through the development of detailed layouts and a phased development program. An environmental review of the proposed development program will also be conducted by State and Federal agencies to identify any potential environmental concerns related to future airport development.